



## The Peri-Parturient Relaxation in Immunity (PPRI)

There is a relaxation in immunity in adult ewes around the time of lambing which means that the worm egg output from the ewe increases. In housed ewes, this is due to higher egg output from established adult worms and from hypobiotic larvae (of *T. circumcincta* and *H. contortus*) which resume their development and are less likely to be expelled. In grazing ewes and ewes turned out to grazing after lambing, the relaxation will also lower the proportion of incoming infective larvae that are rejected and reduce the expulsion of adult worms. The net result is that the FEC (epg) rises from about the time of lambing and increases through early lactation until the ewe regains her strong acquired immunity. This increase in egg output is a source of contamination on pasture. Management strategies seek to reduce this effect.

The exact timing of the PPRI is variable. Typically, it is cited as commencing 2–4 weeks before lambing and persisting for 6–8 weeks, after which time ewes recover their immunity and worm numbers and FECs fall to their pre-lambing levels. However, there are several factors known to influence the extent of the PPRI and ewe FEC levels. This results in significant variation in terms of the time of onset and the extent to which egg output increases between sheep and between flocks of sheep. Key variables are:

- **Nutrition** – it is generally accepted that the PPRI has a nutritional basis and there are numerous reports that support the conclusion that protein, rather than energy, is the limiting factor. The protein demands of pregnancy and lactation are prioritised over those of the immune system which is supported by evidence from work that clearly shows if the demands of lactation are removed by early weaning lambs, the egg output of the ewe falls very quickly as the immune system is restored. Feeding regimes that enhance both body condition and metabolizable protein (MP) supply have been shown to reduce the worm egg output of ewes in the peri-parturient period. The source of the protein supplied is also a factor, with Digestible Undegradable Protein (DUP) supplying an amino acid composition more useful to the immune system than microbial protein. However, work focusing on responses to additional MP and in particular DUP has produced variable results, with no clear indication of whether levels in excess of current recommendations are effective. This may in part be due to the difference between worm species, with the abomasal worms (e.g. *T. circumcincta*) exhibiting a more positive response compared to the intestinal species. A review conducted for the AHDB 'Feeding the Ewe' (2016), concluded that for ewes in good body condition the AFRC (1993) recommendations for MP supply in late pregnancy and early lactation did not need to be increased, but should be considered as a *minimum* requirement.
- **Litter size** – the PPRI is generally less marked in single-bearing/single-rearing ewes than multiple bearing/rearing ewes. However, from recent as yet unpublished evidence derived from monitoring on commercial farms using regular FEC monitoring, it is clear that nutrition may have an overriding effect, with well fed, fit, twin and even triplet bearing ewes capable of egg outputs similar to single bearing ewes.
- **Breed (genetics)** – there are significant differences between breeds and genetic variation within breeds. In particular, the Hill breeds (e.g. Scottish Blackface, [Hamer, et al., 2019](#)) have been shown to be less affected by the PPRI having a lower egg output than crossbred Mule ewes. [See Chapter 2. SCOPS Principles, 2.4 Reduce Dependence, 2.4.3 Breeding for resistance.](#)
- [Feeding the Ewe Literature Review](#). Povey G., Stubbings L., and Phillips K., AHDB